REMARKS/ARGUMENTS

Claims 39-45 and 47-80 are presently pending in this case. Claims 57-77 are withdrawn. Claims 39 and 54, the independent claims are reproduced below for reference:

> Claim 39: A heat spreader comprising:
> a layer of CVD diamond grown onto a diamond loaded (DL) material, the DL material comprising a mass of diamond particles in a matrix and having a surface with exposed diamond particles on which the layer of CVD diamond is grown, the diamond particles having a diameter of at least 10 μm,
> wherein the layer of CVD diamond is bonded to the exposed diamond particles of the DL material at least in part by epitaxy, and the grown layer of CVD diamond has an exposed surface with at least 30% of the exposed surface being occupied by diamond grains with a grain size of at least four times a thickness of the layer of CVD diamond.
>
> Claim 54: A heat spreader comprising:
> a layer of DL material having major surfaces on each of opposite sides thereof, the layer of DL material including diamond particles having a diameter of at least 10 μm; and
> a layer of CVD diamond in thermal contact with each of the major surfaces, with either one or both of the CVD diamond layers being bonded at least in part by epitaxy to exposed diamond particles of the DL material,
> wherein the layer of CVD diamond has an exposed surface with at least 30% of the exposed surface being occupied by diamond grains with a grain size of at least four times a thickness of the layer of CVD diamond.

Applicants thank the Office for withdrawing the previous ground of rejection. For the reasons that follow, it is respectfully submitted that the new rejection applied under 35 USC 103(a) combining Saito and Zhu does not teach or suggest the claimed invention. Further, some of the citations and underlying rationale for the rejection are incorrect and not properly substantiated.

Saito describes a method of making a heat sink by forming a thin diamond layer on a sintered compact containing Cu and W. There is no disclosure whatsoever of a diamond

loaded material or of CVD diamond. At best Saito an example of a thin diamond layer (10-200μm) used as a heat sink.

In relation to Zhu, the rejection states in paragraph 5:

> *'The CVD film is formed on a substrate having diamond grains deposited on the surface of the substrate and incorporated into the matrix material (usually Ni) (see Figure 2). The diamond particles are partially embedded into the surface of the substrate with diamond grains being exposed to the surface (figure 2). The examiner is considering the partially embedded diamond particles to be a DL material having "diamond particles in a matrix"'*

In fact Figure 2 does not disclose diamond at all. It discloses a carbon-containing powder 22 (NOT diamond) deposited onto the nickel substrate 15 (see, e.g., col. 7, lines 16-24 of Zhu). These carbon containing powder seeds 22 are said to "dissolve into the surface of the substrate forming molten areas of Ni-C-H (column 7, lines 22-24) which then solidify to form so-called "solidified intermediate states 23" which are a Ni-C-H solid solution. Diamond then nucleates on the C-rich solid solution regions. The only diamond present in Figure 2 is therefore diamond formed on the surface.

While Applicants understand that, during the prosecution of an application in the Office, claims are to be given their broadest reasonable interpretation consistent with the teaching in the specification (*In re Bond*, 710 F.2d 831, 833 (Fed. Cir. 1990)), it is error to disregard express limitations in the claims.

Applicants submit that the Examiner erred in broadly interpreting the scope and content of the subject matter claimed in a manner inconsistent with the plain language of the claims. Figure 2 does not disclose a "diamond loaded material" as required by the claims.

With respect to other portions of Zhu's disclosure that while not cited in the rejection are not relevant to making the claims obvious.

Figure 3 of Zhu shows diamond seeds 22 which are completely dissolved into the Ni lattice, with the carbon remaining highly concentrated in the regions 23 where the diamond

seeds are originally located and forming a Ni-C-H solid solution (see col. 7, lines 40-45). Diamond 30 then nucleates ON the surface of those regions 23 (Figure 3C and column 7, lines 38-48). Once the diamond seeds have completely dissolved in the Ni lattice they simply provide carbon atoms in the lattice and are no longer "diamond". Therefore as with the Figure 2 embodiment, the only diamond in the grown part is on the surface of the nickel substrate and it does not disclose a "diamond loaded material" as required by in the present claims.

Figure 4 of Zhu is similar to Figure 3 but shows only partial dissolution of the diamond seeds from which diamond then grows. Zhu is completely silent as to the size of the "diamond seeds", but in the context of the application, where these are forming nuclei for diamond growth (in a similar manner to the dissolved carbon or diamond described with reference to Figures 2 and 3), one would understand that these would be very small indeed, of the order of the nuclei used in Deguchi, discussed at length earlier in the prosecution of this application. In this respect it should be noted that Figures 2, 3 and 4 are put forward by Zhu as alternative possible nucleation models. While the Figure 4 model does disclose some residual diamond seed prior to further diamond growth, theses seeds are similar to the seeding nuclei of Deguchi, and Applicants submit it is not correct to interpret this as a "diamond loaded material" as required by our main claim. In any case, there is certainly no disclosure or suggestion in any of the models put forward by Zhu (including the Figure 4 model) of providing a diamond loaded material with a surface with exposed diamond particles having a diameter of at least 10 μm, as required by independent claim 39 of our application.

Also there is not disclosure in Zhu of the grain size of the exposed surface of the CVD diamond layer being at least four times a thickness of the CVD layer as required by independent claim 39 of our application.

Thus, in combination, the cited art simply does not teach or reasonably suggest a layer of CVD diamond grown onto a diamond loaded (DL) material.

Paragraph 10 of the office action posits an argument that does not make any apparent sense. In that discussion of paragraph 10, it is alleged that the combination of the references discloses a required minimum particle diameter of 10 μm, and our required ratio of

$$\frac{\text{diamond grains grain size on exposed surface of CVD layer}}{\text{CVD layer thickness.}} = 4$$

Near as Applicants can understand, the rejection alleges that because Salto discloses a CVD layer of 10-20 μm and a substrate thickness of 200-1000 μm that it would be obvious to provide larger nucleating diamond particles in the layer matrix of Zhu. However, there is no basis for reaching this conclusion and, in fact, it is erroneous. As already discussed there is no mention at all in Zhu of diamond particles with a particle size greater than 10 μm or of a ratio of the diamond grain size to CVD layer thickness of at least 4. There is nothing whatsoever in either reference to suggest the specific sized diamond particles as required by the present invention, nor of the advantages of their selection. Conclusions of obviousness based on clearly erroneous findings, as is here the case, cannot stand. *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1289 (Fed. Cir. 2006).

The Office has the initial burden of proof to establish the prima facie obviousness of the subject matter Applicants claim in view of the prior art teaching. *In re Fritch*, 972 F.2d 1260, 1265 (Fed. Cir. 1992); *In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988). Absent evidence which supports a rejection of the subject matter Applicants claim for obviousness, the Examiner's conclusion that Applicants' claims are unpatentable under 35 U.S.C. §103(a) must be withdrawn.

It is not sufficient for the Examiner to base a rejection for obviousness, as the Examiner has done that it is within the ordinary skill of the artisan to optimize result effective

variables. Persons having ordinary skill in the art would not have acted to optimize the choice or the effect of components Applicants' claims require which the prior art does not disclose and would not have suggested for use in the prior art processes upon which the Examiner relies to make a case for obviousness. Persons having ordinary skill in the art would not have acted to eliminate problems that the applied prior art does not recognize.

Persons having ordinary skill in the art normally seek "to improve upon what is already generally known." *In re Peterson*, 315 F.3d 1325, 1330 (Fed. Cir. 2003). However, before persons having ordinary skill in the art would want to optimize the choice or use of components in a claimed arrangment, the prior art must at least generally recognize it and generally suggest the components the claims utilizes to achieve its goals. To establish that Applicants' claimed process would have been obvious to a person having ordinary skill in the art, the prior art must reasonably suggest that persons having ordinary skill in the art do what Applicants claims require.

The claimed exposed diamond particles in the DL layer having a particle size of at least 10 μm generate a CVD layer with a grain size of at least 4 times the CVD layer thickness, resulting in a unique and new thin, but large grain size CVD layer, the grain size being large not only through the bulk of the CVD layer, but also at the nucleation surface of the CVD layer (i.e. at the DL/CVD layer interface). This may be advantageous for various reasons, e.g. because typically the larger the grain size the higher the coefficient of thermal conductivity).

Here, the only suggestion to do what Applicants have done is Applicants' own disclosure, i.e. hindsight. Thus, where, as here, the rejection of the subject matter Applicants claim is based on hindsight, the rejection is improper. *In re Fritch*, 972 F.2d at 1266; *In re Fine*, 837 F.2d at 1075.

Furthermore, a more careful review of the references reveals that rather than teaching the claimed invention, the cited art teaches away from it. The requirement of Zhu is that the substrate is a transition metal that is capable of dissolving carbon. What motivation could there be to add diamond to the bulk of the substrate when it will be, at least partially if not completely, dissolved during the pre-synthesis treatment process? The preferred substrate in Chu is a single crystal substrate so as to obtain the alignment between the diamond grains that Zhu seeks to achieve. In this condition, the substrate is not a diamond-loaded substrate. Adding diamond grains to the nickel single crystal to make it diamond loaded and then heat treating the substrate will result in a multi-phase material that would not be a single crystal. Therefore, Zhu teachings direct one away from, rather than towards, the claimed invention. see MPEP § 2141.02 (prior art must be considered in its entirety, including disclosures that teach away from the claims).

Reconsideration and withdrawal of the rejection is requested.

A Notice of Allowance is also requested.

Respectfully submitted,

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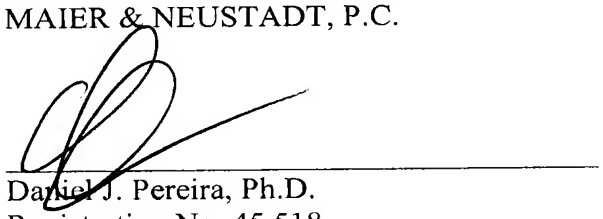

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